MAY 2017

CALIFORNIA WATER SERVICE

# OROVILLE SYSTEM REPORT

WEST YOST ASSOCIATES

CALIFORNIA WATER SERVICE™

# Oroville System Report

**Prepared for**

# California Water Service

**Project #436-12-17-21**

Polly L. Boissevain

Project Manager: Polly Boissevain, Engineering Manager II

5-26-17

Date

Charles W Duncan

QA/QC Review: Charles Duncan, President

5-26-17

Date

## Carlsbad

2173 Salk Avenue, Suite 250
Carlsbad, CA 92008
(760) 795-0365

## Davis

2020 Research Park Drive, Suite 100
Davis, CA 95618
(530) 756-5905

## Eugene

1650 W 11th Ave. Suite 1-A
Eugene, OR 97402
(541) 431-1280

## Irvine

6 Venture, Suite 290
Irvine, CA 92618
(949) 517-9060

## Pleasanton

6800 Koll Center Parkway, Suite 150
Pleasanton, CA 94566
(925) 426-2580

## Portland

4949 Meadows Road, Suite 125
Lake Oswego, OR 97035
(503) 451-4500

## Sacramento

2725 Riverside Boulevard, Suite 5
Sacramento, CA 95818
(916) 504-4915

## Santa Rosa

2235 Mercury Way, Suite 105
Santa Rosa, CA 95407
(707) 543-8506

## Sunnyvale

1250 Oakmead Parkway, Suite 210
Sunnyvale, CA 94085
(408) 451-8453

## Turlock

200 North Broadway, Suite C
Turlock, CA 95380
(209) 226-6020

## Walnut Creek

**1777 Botelho Drive, Suite 240**
**Walnut Creek, CA 94596**
**(925) 949-5800**

# Table of Contents



## List of Tables

# Table of Contents



## List of Figures

## 1.0 INTRODUCTION

California Water Service (Cal Water) has requested that West Yost Associates (West Yost) prepare a report summarizing the Cal Water Oroville District water system facilities, documenting capital projects implemented since 2009, when Cal Water undertook a capital planning effort for the Oroville District. The report also provides system statistics, such as leak and main break history. This report is intended to be a background document to be provided to Butte County Local Agency Formation Commission, who will be conducting a regional water service review for the greater Oroville area.

Cal Water has provided water service to its customers in the City of Oroville and portions of unincorporated Butte County since 1927. Cal Water is regulated by the California Public Utilities Commission (CPUC), which is responsible for setting the water utility rates paid by Cal Water's customers. The CPUC sets rates based on a cost of service model, meaning the rates reflect the full cost of operating, maintaining, and upgrading the water system.

This report is organized into the following sections:

- Section 2: Presents a water system overview
- Section 3: Summarizes capital improvements implemented since 2009
- Section 4: Provides information on maintenance practices and other system statistics
- Section 5: Presents a summary and conclusions from the review

## 2.0 WATER SYSTEM OVERVIEW

This section summarizes the water service area and the water system. Information is drawn from Cal Water's various planning documents and interviews with District staff.

### 2.1 Service Area Overview

Cal Water is one of three water purveyors in the City of Oroville. Cal Water serves a major portion of the City, and small unincorporated areas within Butte County. Figure 2-1 shows the Cal Water service area.

In 2016, the Oroville District had an average daily demand of 2.0 million gallons per day (mgd) and a maximum day demand of 5.7 mgd, where the average daily demand is the annual usage divided by 365 days, and the maximum day demand is the highest usage day within the year. Demands have been decreasing over the last several years, with the highest average day demand in the last 12 years, 3.7 mgd, occurring in 2008, and the highest maximum day demand in the last 12 years, 7.2 mgd, occurring in 2007.

The population within the Oroville District has been increasing steadily but slowly over the last 12 years, from 10,088 in 2005 to 10,543 in 2016, for an average annual growth rate of approximately 0.4 percent, which is the same as the overall Butte County average annual growth rate over the same time-period.

Future growth is anticipated with the development of currently vacant parcels within the existing service area. Population within the District is projected to be just under 13,000 by 2040. Due to planned water conservation programs and State regulations with regards to water use, the projected average daily use in 2040 is 3.2 mgd.

## 2.2 System Configuration and Pressure Zones

Figure 2-2 and Table 2-1 summarize pressure zones and key distribution system facilities in the Oroville District distribution system. The system is supplied from the Oroville Water Treatment Plant (Oroville WTP) and four wells. The Oroville WTP supply is Feather River water, supplied from the Thermalito Power Canal.

**Table 2-1. System Pressure Zones**

| Pressure Zone Hydraulic Grade Line (HGL) | Facilities Providing Supply to Zone | Facilities Supplying Other Zones | Storage Reservoirs |
|---|---|---|---|
| 325 | • Booster Pump Station (Station 15, at Oroville WTP)<br>• Well (Station 2)<br>• Well (Station 10) | • Booster Pump Station (Station 1)<br>• Booster Pump Station (Station 3)<br>• Booster Pump Station (Station 11) | Reservoir (Station 15, at Oroville WTP) |
| 435-1 | • Booster Pump Station (Station 1)<br>• Booster Pump Station (Station 3)<br>• Booster Pump Station (Station 11)<br>• Well (Station 5)<br>• Well (Station WPR / 901) | Booster Pump Station (Station 7) | Reservoir (Station 16) |
| 435-2[(a)] | Booster Pump Station (Station 7) [(b)] | N/A | N/A[(c)] |
| 470 | Booster Pump Station (Station 15) | N/A | N/A[(c)] |

(a) Zone 435-2 is now combined with zone 435-1.
(b) Currently inactive.
(c) Hydropneumatic tank at booster pump station.

Each of the major zones, Zone 325 and 435-1, has distribution system storage reservoirs. Zone 325 includes about 38 percent of the system demand. Zone 435-1 includes about 60 percent of the demand. The two small hydropneumatic zones, 470 and 435-2, include the remaining 2 percent of demand. District staff has indicated that the facilities for supplying Zone 435-2 are inactive, and that Zone 435-2 is now combined with Zone 435-1.

## 2.3 Supplies

The supplies for the Oroville District consist of surface water from the Feather River and groundwater. The flexibility of having both surface water and groundwater supplies allows Cal Water to deliver high quality water to the Oroville distribution system throughout the year. When significant rainfall events increase surface water turbidity, making surface water more difficult to treat, Cal Water switches to groundwater supplies to meet system demands.

### 2.3.1 Surface Water Supply

Cal Water purchases water from Butte County and Pacific Gas and Electric Company (PG&E). Butte County is a State Water Project (SWP) contractor and contracts with Cal Water for delivery of a portion of its SWP allocation. SWP supply is conveyed through Lake Oroville to the Thermalito Power Canal, where Cal Water pumps it to the Oroville WTP reservoir via Cal Water's Station 14 Pump Station. Water supply from PG&E comes from the West Branch of the Feather River, after use by PG&E for hydroelectric operations.

Surface water supplies are treated at Cal Water's 7.0 mgd Oroville WTP. The Oroville WTP, called Station 15, is a conventional treatment plant consisting of sedimentation basins and a gravity sand and anthracite filtration system. Treated water from the sand filters enters a sump where four pumps deliver water to the 450,000-gallon treated water reservoir at Station 15. All treated water from the Oroville WTP is pumped into the Station 15 reservoir. From Station 15, supply is fed by gravity into Zone 325, which is also referred to as the Low Zone. Hydropneumatic Zone 470 is supplied by pumps that pump from the Station 15 reservoir.

### 2.3.2 Groundwater Supply

There are four groundwater production wells within the Oroville District. Table 2-2 summarizes information about the wells. Wells draw from the Feather River alluvial fan, which underlies the Oroville District.

**Table 2-2. Water Supply Wells**

| Station | Service Zone | Year Well Drilled | Well Depth, feet | Flow Rate, gpm | Total Dynamic Head, feet | Pump HP | Pump Installation Date |
|---|---|---|---|---|---|---|---|
| 2 | 325 | 1928 | 153 | 900 | 245 | 100 | 2016 |
| 5 | 435-1 | 1949 | 340 | 265 | 320 | 30 | 2007 |
| 10 | 325 | 1956 | 150 | 680 | 215 | 75 | 2010 |
| WPR (901) | 435-1 | 1940's | 152 | 455 | 350 | 60 | 2007 |

## 2.4 Booster Pump Stations

The system has five booster pump stations. Table 2-3 summarizes the hydraulic parameters for the pump stations and individual pumps within the Oroville District.

**Table 2-3. Booster Pump Stations**

| Station | Source Zone | Service Zone | Unit | Pump Capacity, gpm | Total Dynamic Head, feet | Pump HP | Pump Installation Date |
|---|---|---|---|---|---|---|---|
| 1 | 325 | 435-1 | B | 900 | 140 | 160 | 2007 |
| | | | C | 1150 | 160 | 160 | 2000 |
| 3 | 325 | 435-1 | A | 1200 | 175 | 175 | 1946 |
| 7 | 435-1 | 435-2 | A | 60 | 72 | 73 | 1949 |
| 11 | 325 | 435-1 | A | 330 | 120 | 104 | 1956 |
| | | | B | 680 | 140 | 112 | 1956 |
| 15 | WTP | 325 | A | 1600 | 35 | 33 | 2000 |
| | | | B | 1600 | 35 | 33 | 1975 |
| | | | C | 1600 | 35 | 33 | 1975 |
| | | | D | 1600 | 35 | 33 | 1975 |
| | WTP | 470 | E | 350 | 110 | 110 | 1999 |
| | | | F | 350 | 110 | 100 | 1975 |

## 2.5 Storage Tanks

The Oroville District has two storage tanks within the distribution system, with a total storage volume of 2.45 million gallons (MG). Table 2-4 summarizes the parameters of the tanks.

**Table 2-4. Storage Tanks**

| Station | Service Zone | Volume, MG | Tank Type | Base Elevation, feet | Overflow Elevation, feet | Height, feet | Diameter, feet | Year Installed |
|---|---|---|---|---|---|---|---|---|
| 15 | 325 | 0.45[(a)] | Ground-Level Welded Steel | 307 | 326 | 19 | 64 | 1976 |
| 16 | 435-1 | 2 | Ground-Level Welded Steel | 410 | 435 | 25 | 117 | 1968 |

[(a)] 0.3 MG of the reservoir is reserved for providing disinfection credit for the Oroville WTP.

## 2.6 Pressure Reducing Valves

The Oroville District has one pressure reducing valve (PRV) that supplies Zone 325 from Zone 435-1. The valve helps to control the hydraulic grade line in zone 325 when the Station 15 reservoir is not in service and wells are supplying the system. The PRV is at an elevation of 180 feet above mean sea level.

## 2.7 Pipelines

There are 59 miles of pipe in the entire system, ranging from less than 4 inches up to 30 inches in diameter. Table 2-5 summarizes the existing pipelines within the Oroville District by length, diameter and material.

**Table 2-5. Pipeline Characteristics Summary**

| Diameter | Material, Length in feet | | | | | | | | | | Total Length | Percentage of Total Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Asbestos Cement | Concrete Cylinder Pipe | Cast Iron | Cement Lined and Coated Steel | Copper | Ductile Iron | Polyvinyl Chloride | Steel | Wrought Iron | Unknown | | |
| <4 | - | - | 3,288 | - | 687 | - | 10 | 1,053 | 7,905 | 429 | **13,371** | **4%** |
| 4 | 5,222 | - | 21,631 | 36 | - | 36 | 51 | 4,879 | 5,717 | 58 | **37,629** | **12%** |
| 6 | 45,215 | - | 32,551 | 120 | - | 3,746 | 10,503 | 8,960 | 3,580 | 758 | **105,433** | **34%** |
| 8 | 52,991 | - | 11,863 | 128 | - | 3,077 | 16,823 | 3,645 | 5,783 | 250 | **94,558** | **30%** |
| 10 | 2,340 | - | 662 | 12 | - | 264 | - | 38 | - | 10 | **3,326** | **1%** |
| 12 | 40,069 | - | 3,665 | 198 | - | 460 | 1,999 | - | - | 280 | **46,672** | **15%** |
| 14 | - | - | 64 | - | - | - | - | - | - | - | **64** | **0%** |
| 16 | 2,019 | - | - | - | - | 3,511 | - | 32 | - | 7 | **5,568** | **2%** |
| 18 | - | - | - | - | - | - | - | - | - | 473 | **473** | **0%** |
| 20 | - | - | 128 | 23 | - | - | - | 3,016 | - | 445 | **3,611** | **1%** |
| 24 | - | - | - | - | - | - | 105 | - | - | 490 | **596** | **0%** |
| 30 | - | 1,064 | - | - | - | - | - | - | - | - | **1,064** | **0%** |
| **Total** | **147,854** | **1,064** | **73,852** | **517** | **687** | **11,094** | **29,491** | **21,621** | **22,986** | **3,200** | **312,364** | **100%** |
| **Percentage** | **47%** | **0%** | **24%** | **0%** | **0%** | **4%** | **9%** | **7%** | **7%** | **1%** | **100%** | |

### 2.8 Emergency Connections

The Oroville District has one standby connection with the Thermalito Water and Sewer District (TWSD), which was installed in 2002. The interconnection consists of an 8-inch, 2-way meter installed between a TWSD main and a Cal Water main on Worthy Avenue. The interconnection is in Zone 470. This connection provides a benefit for customers in the area during maintenance outages and emergencies by providing a supplemental supply source. The connection was used to provide supplemental supply during a tank repair project.

## 3.0 CAPITAL PROGRAM REVIEW

This section reviews the capital program that Cal Water has implemented since 2009. This section is organized into the following subsections:

- Section 3.1: Provides an overview of the planning process
- Section 3.2: Summarizes the capital planning efforts that Cal Water has undertaken
- Section 3.3: Summarizes the implementation of capital projects

### 3.1 Overview of Capital Planning Process

Cal Water conducts short-term and long-term planning for each of its water systems to evaluate distribution system needs to address system deficiencies and evaluate improvements. Planning evaluations assess system needs based on: current system performance; planned future growth and how that impacts system performance; and system renewal and replacement needs, all of which are balanced against the impact any particular project will have on the cost of service.

The CPUC conducts a thorough review of Cal Water's operations, expenses, and proposed water system improvements through the General Rate Case (GRC) process. The purpose of the GRC is to ensure that the rates accurately reflect the cost of providing service and that Cal Water is appropriately operating, maintaining, and upgrading its facilities.

Every three years, Cal Water is required to prepare and submit a GRC application to the CPUC. The GRC application includes in-depth information about Cal Water's financials, completed water system improvements, projected expenses, and proposed capital projects, along with detailed justifications for those proposed projects.

In developing information for the GRC, Cal Water uses various planning documents and an internal planning process. The first step in this process is to develop criteria to determine which projects need to be completed over the subsequent three-year period based on various regulatory and non-regulatory triggers. After using these criteria to review and analyze the system, projects are recommended to address issues identified with water quality, water supply, storage, and maintenance problems. Where clear solutions to identified issues are not apparent, alternatives are analyzed to identify a preferred solution. The initial list of projects is then evaluated to determine if multiple projects could be grouped together to be more cost effective.

The list of projects is then reviewed with individual Cal Water districts to obtain feedback and identify other local projects that should be considered. Projects are then evaluated to assess their

potential impact on the cost of service. After this internal review process is completed and a final list of projects and their respective justifications is completed, the project list is submitted to the CPUC as part of Cal Water's GRC application.

Once the GRC is submitted, an Administrative Law Judge (ALJ) is assigned to oversee the proceeding. The Office of Ratepayer Advocates (ORA), an independent state agency whose statutory mission is to advocate on behalf of the customers of the utilities regulated by the CPUC, and other parties in the proceeding review the application and submit their own testimony. The CPUC hosts public hearings on the application. Presuming the parties to the proceeding do not reach a settlement agreement on the application, formal evidentiary hearings are held and presided over by the assigned ALJ. At the conclusion of the process, the ALJ issues a proposed decision that is voted on by the CPUC Commissioners. The final decision in the proceeding establishes Cal Water's rates, budgets, and approved water system improvements for the subsequent three-year period. The entire review process takes approximately 18 months.

## 3.2 Capital Planning Efforts

This section provides a summary of Cal Water's recent capital planning efforts.

### 3.2.1 2009 Capital Improvement Plan (2009 Plan)

In 2009, Cal Water undertook a capital planning effort that evaluated both near-term and long-term needs of the Oroville District. The planning effort evaluated the District's supply and distribution system to assess their ability to meet existing and future system demands. The scope of the project included the following:

- Analysis of a long-term water supply strategy;
- Evaluation of the key facilities capacities to meet existing and future demands;
- Hydraulic evaluation of the water distribution system for existing and future demand to assess system performance;
- Reliability evaluation; and,
- Asset evaluation to inventory facilities and identify renewal and replacement needs.

The existing demand conditions were analyzed and projections for future development and demands were prepared for use in the supply and facilities evaluation. These demand projections were used to evaluate the existing facilities, including the distribution pipeline network, pumping facilities and storage facilities. A computerized hydraulic model of the distribution pipeline network was developed and calibrated for use as a planning and operational tool. Demand projections were also used to evaluate the adequacy of the water supply sources for the planning period, which included a review of both the surface and ground water supplies, and the water quality of each. A water supply strategy was developed with recommendations and alternatives.

A renewal and replacement evaluation was also conducted as part of the project, which consisted of a visual assessment of the distribution system facilities (raw water facilities, Oroville WTP, wells, distribution system pump stations, and distribution system reservoirs) to assess condition, recommend improvements and evaluate replacement based on the design useful life expectancies of

facilities. The project did not include a pipeline renewal and replacement analysis, but identified pipeline replacement projects based on projects planned by Cal Water and included in the 2009 GRC.

### 3.2.2 Cal Water Asset Management Program

An important part of Cal Water's commitment to managing its infrastructure to provide safe and reliable water to its customers is the regular replacement of pipelines. Historically, Cal Water's Main Replacement Program focused on replacement of small-diameter and unlined steel mains to improve system flow capacity and pipeline reliability, with a goal to replace all mains in these categories within a 25 to 50-year period. Decisions for replacement targeted mains less than 6-inch diameter and unlined steel mains that are 6-inches in diameter or larger, with priorities based on leak history and fire flow capacity. Cal Water used a leak tracking system to develop leak history for individual mains, and used leaks per 100 miles of main to set targets for main replacements within each Cal Water District.

In 2007, Cal Water started developing a more robust Pipeline Asset Management Program for its pipelines to address pipeline replacement more comprehensively, with the goal to manage the entire lifecycle of assets to achieve an acceptable level of service to customers, with an acceptable level of risk exposure, at an affordable cost. The program objectives included: reducing the risk of damage to the environment and local infrastructure by unplanned main breaks; increasing system reliability and service delivery to customers by replacing pipelines with a high likelihood of failure; and, reinvesting capital funding in the infrastructure more efficiently by targeting pipelines in poor condition. The following is a timeline that describes the activities that were undertaken to develop the current program:

- 2006 –ORA recommended developing an Asset Management (AM) Program
- 2007 – Cal Water engaged Westin Engineering to perform AM assessment
- 2009 – ORA and Cal Water agreed to pilot a new main replacement program
- 2012 – Pipeline asset data collection; age, materials and size
- 2012 – Risk Management study identified several risks from the distribution system
- 2012 – Kicked off main replacement pilot with the ORA
- 2013 – Piloted KANEW software and RIVA decision support tool
- 2013 – Presented results of pilot to ORA for the Cal Water Stockton District
- 2014 – Deployed the American Water Works Association (AWWA) forecasting tool, developed and deployed AM program for pipelines in preparation for the 2015 GRC

Cal Water considers typical ranges of design useful life assumptions for major water system components. The design useful life estimates indicate when rehabilitation or replacement may be needed. Cal Water will typically plan its rehabilitation and replacement programs using not only the design useful life expectancies, but also information indicating the condition of their facilities such as leak/break records for pipelines, and maintenance or repair records and field assessments of pump stations and reservoirs.

## 3.3 Capital Improvement Program Implementation

This section summarizes capital investments since 2009.

### 3.3.1 Water Supply Strategy

The 2009 capital planning effort evaluated whether Cal Water should:

- Continue with the current supply mix, including use of treatment of water at the Oroville WTP, supplemented with groundwater wells;
- Continue to purchase PG&E water or purchase more Butte County SWP water;
- De-commission the Oroville WTP and purchase treated water from South Feather Water and Power Agency; or,
- Switch to an all groundwater supply.

The recommended water supply strategy was to continue with the current supply mix, and continue to purchase water from PG&E, because it was the most cost-effective and reliable future water supply strategy. These improvement recommendations are summarized in Table 3-1, along with other Oroville District projects.

**Table 3-1. Supply Improvements**

| Improvement | Status |
|---|---|
| 2009 Capital Planning Recommendations | |
| Make improvements to the Lower Miocene Canal, including flume repair | Repairs completed in 2009. Some flumes still need repair[(a)] |
| Line the Lower Miocene Canal to reduce water loss and recoup water for potential sale | No longer required with change in point of diversion to the Thermalito Power Canal |
| Other District Projects | |
| Lower Miocene Canal Study | Completed in 2009 |
| Station 14 Improvements | Completed in 2010 |
| Re-construct Gold Run Diversion | Completed in 2012 |
| Gunite earthen ditch | Completed in 2016 |

(a) Flume projects not yet completed since canal is no longer used for deliveries to the Oroville WTP.
(b) Minor repair project budgets are typically funded from non-specific capital budgets or attached to a larger project and not accounted for separately.

Historically, Cal Water's PG&E supply was delivered to the Oroville WTP via the Lower Miocene Canal, an unlined canal, which has significant seepage losses. The 2009 capital planning effort identified $1M in canal improvements that would be needed to meet the District's supply needs, and a potential $5M longer-term project to re-line the canal to reduce seepage losses and recoup the water for possible sale.

To improve supply reliability and reduce operating costs, Cal Water worked over a several-year period to negotiate agreements with PG&E and California Department of Water Resources (DWR) (operator of Lake Oroville) for PG&E to divert Cal Water's surface water into Lake Oroville from the Lime Saddle Pump Station. In 2010, Cal Water completed improvements to increase the capacity of its Station 14 pump station on the Thermalito Power Canal, to pump water into the Oroville WTP. Cal Water has been operating with the new diversion from the Thermalito Power Canal for about three years. Cal Water still operates the Lower Miocene Canal to supply several irrigation customers.

According to Oroville District staff, the supply from the Thermalito Power Canal is colder and generally has lower turbidity than water from the Miocene Canal, making it easier to treat. With supply now diverted from the Thermalito Power Canal, Cal Water indicates that the source water quality is improved. The federal Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) requires water systems to monitor source water characteristics and provide additional treatment if their source is vulnerable to microbial contaminants. Continued diversion from the Miocene Canal would have required treatment upgrades to meet LT2ESWTR regulation. With the change in diversion point to the Thermalito Power Canal, Cal Water's current treatment processes are adequate to meet the regulation.

The change in diversion to the Thermalito Power Canal resulted in significant long-term cost-savings for Cal Water's customers by eliminating the need for both long-term operating and maintenance costs for the Lower Miocene Canal, and for Oroville WTP process improvements to meet the LT2ESWTR regulation.

### 3.3.2 Water Treatment Plant

The 2009 Plan contained a list of recommended projects at the Oroville WTP, which were related to components having reached their useful life. The recommended projects were intended to help increase hydraulic capacity, increase water quality performance or reduce operator workload. Table 3-2 summarizes recommendations for projects at the Oroville WTP, and their current status. The table also includes other projects that the District has completed.

**Table 3-2. Oroville WTP Projects**

| Improvement | Status |
|---|---|
| 2009 Capital Planning Recommendations | |
| Repair leaking flume between mixer and basin | Completed[a] |
| Increase cross-sectional flow area between Basins 1 and 2 and Basins 2 and 3 by replacing ports with a baffling wall | Completed[a] |
| Modify and add baffling walls in basins to improve length to width ratio and overall performance | Completed[a] |
| Automate operation of pump that recycled water from settling ponds to forebay to provide consistent flows | Completed [a] |
| Increase CT reliability by calculating contact times between Basin 3 and the sump | Completed[a] |
| Increase wall height in forebay to mixer to prevent overflows | Completed [a] |
| Replace 800 feet of auxiliary pipe in raw water ditch | Currently being implemented |
| Re-sand sludge basins | Completed in 2010 |
| Chlorine cell | Completed in 2011 |
| Metal covers over filters | Not performed — not necessary at this time[b] |
| Replace air scour valves on filters | Completed in 2010 |
| Pave parking area | Scheduled for 2017 per GRC |
| Replace lining in Oroville Reservoir and Sed Basin 3 | Completed in 2009 |
| Backwash recovery valve | Completed in 2014 |
| Other District Projects | |
| Filter Valve replacements | Completed in 2009 |
| New filter media | Completed 2011 |
| Treatment plant controls | Completed in 2013 |
| Chlorine generation unit | Completed in 2015 |
| Filter control modifications | Completed in 2014 |
| Fencing and security | Completed in 2015 |
| Replace filtering sand | Completed in 2016 |
| Install generator | Currently being implemented |

(a) Minor repair project budgets are typically funded from non-specific capital funds or attached to larger projects so dates of completion are not shown.

(b) This project was cancelled after review with treatment experts indicated that pre-chlorination practices reduce the risk of algae growth.

### 3.3.3 Well Sites

The 2009 Plan provided recommendations to replace the pump and motor at Station 10 and to replace the pump at Station 2. All well pumps have been replaced in the last 10 years. Table 3-3 summarizes recommendations for projects at the wells, and their current status. The table also includes other projects that Oroville District has completed.

**Table 3-3. Well Projects**

| Improvement | Status |
|---|---|
| 2009 Capital Planning Recommendations | |
| Replace STA-2 pump | Replaced pump and motor in 2016 |
| Replace STA-10 pump and motor | Replaced STA-10 motor in 2009. Replaced pump in 2012. |
| Construct new well | Project deferred. Project under consideration for future GRC[(a)] |
| Other District Projects | |
| STA-2, new flow recorder | Completed in 2014 |

(a) The new well project was deferred due to lack of growth in service area and lower demands, so additional supply capacity is currently not needed. The project will be re-considered as system demands increase.

In addition, at Station 2, Oroville District has landscaped the area and included a rain garden to retain stormwater runoff.

### 3.3.4 Booster Pump Stations

The 2009 Plan provided recommendations to replace several booster pumps in the system. Table 3-4 summarizes the recommendations. The table also includes other projects that the Oroville District has completed.

**Table 3-4. Pump Station Projects**

| Improvement | Status |
|---|---|
| 2009 Capital Planning Recommendations | |
| Replace Booster Pumps at End of Useful Life – 2009 capital planning budgeting assumed eight replacements between 2010 and 2015, based on design life of pumps | • Replaced pump and motor 1-B in 2010<br>• Replaced motor 1-C in 2011<br>• Replaced motor 3-A in 2014<br>• Replaced motor 15-B in 2014<br>• Replaced pump and motor 15-C in 2016<br>• Replacement for Station 1 and 3 currently being designed |
| Other District Projects | |
| STA-3 main disconnect replacement | Completed in 2013 |

The 2009 Plan identified specific pump replacements based on design useful life, and then created a placeholder budget for eight pump replacements between 2010 and 2015. Cal Water typically conducts pump efficiency testing, and uses this information along with pump condition, to determine when pumps should be replaced. The Oroville District is currently designing a replacement station for Stations 1 and 3 to modernize the station, improve its operational efficiency, and reduce its operating costs.

### 3.3.5 System Storage

The 2009 Plan provided a recommendation to construct 1.4 MG of additional storage as part of the capacity analysis and to replace the hydropneumatic tank at the Oroville WTP as part of the rehabilitation and renewal analysis. These recommendations are summarized in Table 3-5, along with storage-related projects that the Oroville District has implemented in the last few years.

**Table 3-5. Storage Projects**

| Improvement | Status |
|---|---|
| 2009 Capital Planning Recommendations | |
| Construct 1.4 MG Storage in Zone 325 | This project has not been implemented |
| Replace STA-15 Hydro Tank | Completed in 2016 |
| Other District Projects | |
| Replace tank berm STA 16 - High Duty Res | Completed in 2010 |
| Replace tank berm STA-15 | Completed in 2010 |
| Paint Interior, Upgrade Cathodic Protection | Completed in 2012 |
| Paint Interior STA-16 | Completed in 2012 |
| STA-16 Cathodic Protection System Upgrades | Completed in 2016 |

The 2009 Plan identified a need for new storage in Zone 325 to provide additional storage capacity. This project has not been completed because water tank projects have focused on protecting and maintaining existing facilities, which is generally more cost-effective than building new storage facilities and because water conservation efforts have decreased water demand.

### 3.3.6 Distribution System Pipelines

Table 3-6 summarizes the projects that were recommended in the 2009 Plan, as well as other projects that the Oroville District has implemented recently.

| Table 3-6. Pipeline Projects | |
|---|---|
| Improvement | Status |
| 2009 Capital Planning Recommendations | |
| Virginia Avenue, replace 1,700 feet of 6-inch with 8-inch | Completed in 2009 and 2010. Project extended to address leaking mains. Included 2,400 feet of 8-inch and 700 feet of 6-inch. |
| Oak Street, replace 950 feet of 2-inch with 6-inch | Completed in 2011 |
| Linden Avenue, replace 960 feet of 4-inch, 6-inch and 7-inch with 6-inch | Constructed portion of project in 2012. Southern portion of project cancelled because there have been no leakage problems. |
| First Avenue, replace 650 feet of 2-inch with 6-inch | Cancelled to use funds for Oak Street project |
| Wilcox Avenue, replace 860 feet of 4-inch with 6-inch | Completed in 2012 |
| Other District Projects | |
| Relocate 8-inch main in Spencer | Completed in 2011 |
| Valve replacement program | Completed in 2011 |
| Unscheduled main replacements | Completed in 2012 |
| Lincoln Blvd upgrades | Completed in 2013 |
| Lincoln, 1300 feet and length of easement | Completed in 2014 |
| Daryl Porter Main Replacement | Completed in 2015 |
| Acacia, 535 feet of 6-inch | Completed in 2015 |
| 3rd Avenue, 1096 feet of 8-inch PVC | Completed in 2016 |
| Bridge Street, 700 feet of 12-inch DI | Completed in 2016 |

In 2006, Butte County conducted a Municipal Services Review of the Oroville District system where it provided a summary of determinations, which lists findings for the areas evaluated in the report. The determination related to the distribution system was that while the majority of facilities utilized by Cal Water's Oroville District are in good condition, some areas are in need of significant rehabilitation, such as the pipelines used by the El Medio Fire District in the southern portion of the Oroville District's service area, generally south of Wyandotte Avenue (see Figure 2-1). The 2009 capital planning effort assessed pressures in this area, and concluded that the problems described appeared to result from the rapid opening or closing of hydrants that cause transient pressure problems. Some of the pipeline replacement projects that were identified in the 2009 Plan and implemented by Cal Water are within the El Medio Fire District area, including pipelines along Virginia Avenue and Clinton Avenue.

### 3.3.7 Other System Improvements

Table 3-7 summarizes other system improvements, including standby generators, security and Supervisory Control and Data Acquisition (SCADA) system improvements.

| Table 3-7. Other Projects | |
|---|---|
| Improvement | Status |
| 2009 Capital Planning Recommendations | |
| Generator at WTP | Currently being completed |
| Generator at Station 1 | Will be included as part of Station 1 and 3 replacement project |
| Generators at wells | Not yet completed [(a)] |
| Security Improvements, Stations 2 and 10 | Completed in 2011 and 2012 |
| SCADA System improvements at WTP and Station 11 | Completed in 2011 |
| Other District Projects | |
| Data Acquisition Radio Replacement | Completed in 2016 |
| Solar Powered Transmitter | Completed in 2016 |

(a) These projects are lower priority than providing standby generator at WTP, since the WTP provides the majority of supply to the system.

The 2009 Plan provided recommendations to install generators at the Oroville WTP, the Station 1 booster pump station and at Wells 2, 5, 10 and Cal Water's proposed new well. The Oroville District is currently completing a project to install standby power at the Oroville WTP. Cal Water is also in the process of designing a new booster pump station that will replace the existing booster pump stations at Stations 1 and 3, and will include an onsite generator. Standby power has not yet been installed at the three existing wells, since these projects are considered lower priority than providing standby power at the Oroville WTP which will allow continued operation of the Oroville WTP, the system's principal supply source, following power failure.

The 2009 Plan recommended implementing security improvements at Stations 2 and 10. Improvements were completed in 2011 and 2012, as part of a comprehensive program to improve security at Oroville District system facilities. Improvements included installing new fencing, high-security locksets, security bars and backup systems for Oroville District's SCADA system.

The Oroville SCADA system is used to monitor and control operations at the Oroville WTP and key distribution system facilities. Major upgrades to the SCADA system were completed in 2011. The upgrades enable operation and monitoring of all facilities, either from the Oroville WTP, or from a remote location. During the February 2017 evacuation of the City of Oroville and surrounding areas due to emergency operations at Oroville Dam, the Oroville District water system was operated remotely from the Cal Water Chico District headquarters.

### 3.3.8 Capital Program Summary

Table 3-8 summarizes capital expenditures in the Oroville system for the improvements identified in Section 3.3.1 through 3.3.7. The capital costs shown in the table summarize Cal Water's capital investments made in system facilities and pipelines to enhance system capacity, improve reliability and/or maintain facilities condition. The table does not include other capital expenditures, such as

equipment purchases, completion of the metering program, or hydrant replacements. Costs shown in Table 3-6 are about 90 percent of overall system capital expenditures for 2009 through 2016.

**Table 3-8. Capital Expenditure Summary for 2009 through 2016**

| Program Area | Capital Cost |
|---|---|
| Water Supply | $1,250,000 |
| Water Treatment | $1,140,000 |
| Wells | $230,000 |
| Booster Pump Stations | $125,000 |
| System Storage | $750,000 |
| Distribution System Pipelines | $3,815,000 |
| Other System Improvements | $393,000 |
| **Total** | **$7,703,000** |

## 4.0 OTHER SYSTEM INFORMATION

This section discusses general maintenance practices in the distribution system, and provides statistics on pipeline age, water loss and main breaks.

### 4.1 General Maintenance Practices

Cal Water's maintenance program includes addressing and repairing problems or defects as they are discovered during frequent routine inspections that are performed according to the schedule provided in Table 4-1. Cal Water also proactively conducts preventative maintenance tasks that prevent failures from occurring. Preventative maintenance tasks are triggered either by equipment operating time or by calendar. Many of these maintenance tasks and corrective actions require facilities to be taken off-line, which Cal Water is able to flexibly manage in winter periods of low demand by alternating the operation of the surface water treatment plant with its groundwater wells.

**Table 4-1. Existing Inspection and Maintenance Schedules**

| Water System Asset | Action | Frequency |
|---|---|---|
| Gauges and Flow Meters | In-depth Inspection and Calibration | Annually |
| Water Treatment Plant | Monitored | Continuously by SCADA |
| | Service Mechanical Equipment | Quarterly and Annually |
| | Sedimentation Basin and Raw Water Storage Grit Removal | Every 6 Months |
| | As-Needed Mechanical Equipment Replacements | Annually |
| Booster Pumps | Visual Site Inspection | Daily |
| | Pump Lube/Oil/Preventative Maintenance | Manufacturer's Run-time Recommendation or Annually |
| | In-depth Facility Inspection | Every 3 Years |
| Wells | Visual Site Inspection | Daily |
| | Chemical Feed Equipment Monitored | Daily when Operating |
| | Exercised for Water Quality Testing | Monthly |
| | In-depth Inspection | Every 3 Years |
| Water Storage Reservoirs | Visual Site Inspection | Daily |
| | Cathodic Protection Inspection | Weekly |
| | Exterior Inspection | Every 5 Years |
| | Interior Inspection | Every 5 Years |
| Blowoff Assemblies | Flush Low Flow Areas | Annually |
| | Flush | Every 5 Years |
| Distribution System Piping | Flush Dead-Ends in Low-Flow Areas | Annually |
| | Flush All Dead-End Distribution Mains | Every 5 Years |
| Distribution System Valves | Exercise and Inspection | Every 5 Years |
| Hydrants | Exercised | Annually |
| | Flow Tests | As-needed |
| Generators | Test | Monthly |
| | Service and Inspection | Annually |
| Pressure Reducing Stations | Visual Inspection | Annually |
| | Rebuilt | Every 5 Years |
| Service Meters | Residential Meter Accuracy | Every 5 Years |
| | Commercial Meter Accuracy | Annually |

## 4.2 Pipeline Age

Table 4-2 summarizes age statistics for distribution system pipelines, compiled from Cal Water's geographic information system. Approximately 32 percent of the system is at least 70 years old. Most of the pipes in this age bracket are either cast iron or welded iron. Approximately 34 percent of the system is between 50 and 70 years old. Most of the pipes in this age bracket are asbestos cement. The pipelines in each of the age brackets mentioned above are performing well, as the Oroville District does not experience a significant amount of breaks and/or leaks.

**Table 4-2. Length of Pipe By Age Range**

| | Pipeline Length, feet | | | | |
|---|---|---|---|---|---|
| | Before 1948 (70+ years old) | 1948 – 1967 (50 – 70 years old) | 1968 – 1987 (30 – 50 years old) | 1988 – Present (less than 30 years old) | Total, feet |
| Total Length | 99,284 | 105,405 | 70,854 | 37,067 | 312,610 |
| Percentage | 32 | 34 | 23 | 12 | 100 |

## 4.3 Non-Revenue Water

Non-revenue water, is the difference between water supplied to the system and water consumed. Cal Water completed its residential metering program in 2013. Prior to that point in time, non-revenue water could only be estimated. Non-revenue water has been calculated for each year since 2013, when the residential metering program was completed. The calculated values for the last three years for non-revenue water in the Oroville District are provided in Table 4-3.

**Table 4-3. Non-Revenue Water**

| Parameter | 2014 | 2015 | 2016 | Average, 2014 - 2016 |
|---|---|---|---|---|
| Total Water Produced, thousand gallons, kGals | 869,313 | 756,755 | 737,093 | 787,720 |
| Total Water Sales, kGals | 799,299 | 699,701 | 679,704 | 692,901 |
| Non-Revenue Water, kGals | 70,014 | 57,054 | 57,389 | 61,485 |
| Non-Revenue Water, percent | 8.1 | 7.5 | 7.8 | 7.8 |

Historically, non-revenue water of 10 percent or less has been considered an acceptable level for water utilities. Cal Water's non-revenue water percentage ranged from 7.5 to 8.1 percent, starting in 2014, the first year after completing the metering program. In 2015, California Senate Bill 555 the *Urban Retail Water Suppliers: Water Loss Management* bill was passed, which will require more detailed reporting on water loss, starting in 2017. DWR has developed a Water Audit Method tool that enables utilities to better quantify losses attributable to metering and data errors or leakage. The tool also incorporates financial statistics to evaluate the cost of water loss so that utilities can identify cost-effective ways to reduce water loss. Cal Water staff have been trained in

the use of the Water Audit Method tool, and used it for reporting water loss information in their 2015 Urban Water Management Plan.

### 4.4 Main Replacement Rates

The Oroville District system has a total of 59 miles of water mains. From 2009 through 2014, main replacement rates in the Oroville District ranged from 318 feet per year to 2,955 feet per year, with an average of 2,034 feet per year, or 0.65 percent per year of all pipelines. In its 2015 GRC, Cal Water used the AWWA replacement model forecasting tool to estimate the percentage of high risk pipelines in each system. For the Oroville District system, 0.5 percent of the system was judged to be high-risk. The CPUC approved a main replacement rate of 0.5 percent per year for 2016 through 2018, or 1,558 feet per year.

### 4.5 Breaks and Leaks

The Oroville District provided information on the number of breaks and leaks that have occurred within the Oroville District, which are shown in Table 4-4. Using the total length of pipelines within the Oroville District, the number of breaks and leaks per 100 miles of pipe per year was calculated. These values are also shown in Table 4-4. The Oroville District has indicated that these values are for both leaks and breaks, as the Oroville District tracks both, but does not distinguish between the two.

| Table 4-4. Breaks and Leaks | | |
|---|---|---|
| Year | Breaks/Leaks | Breaks or Leaks per 100 miles of Pipe |
| 1991 | 2 | 3.4 |
| 1992 | 9 | 15.2 |
| 1993 | 9 | 15.2 |
| 1994 | 15 | 25.3 |
| 1995 | 6 | 10.1 |
| 1996 | 1 | 1.7 |
| 1997 | 16 | 27.0 |
| 1998 | 6 | 10.1 |
| 1999 | 9 | 15.2 |
| 2000 | 4 | 6.8 |
| 2001 | 8 | 13.5 |
| 2002 | 32 | 54.0 |
| 2003 | 8 | 13.5 |
| 2004 | 5 | 8.4 |
| 2005 | 14 | 23.6 |
| 2006 | 8 | 13.5 |
| 2007 | 3 | 5.1 |
| 2008 | 2 | 3.4 |
| 2009 | 1 | 1.7 |
| 2010 | 1 | 1.7 |
| 2011 | 0 | 0.0 |
| 2012 | 0 | 0.0 |
| 2013 | 2 | 3.4 |
| 2014 | 17 | 28.7 |
| 2015 | 6 | 10.1 |
| 2016 | 7 | 11.8 |
| Average | 7.3 | 12.4 |
| Note: Total length of pipe in the system is 312,000 feet, or approximately 59 miles. | | |

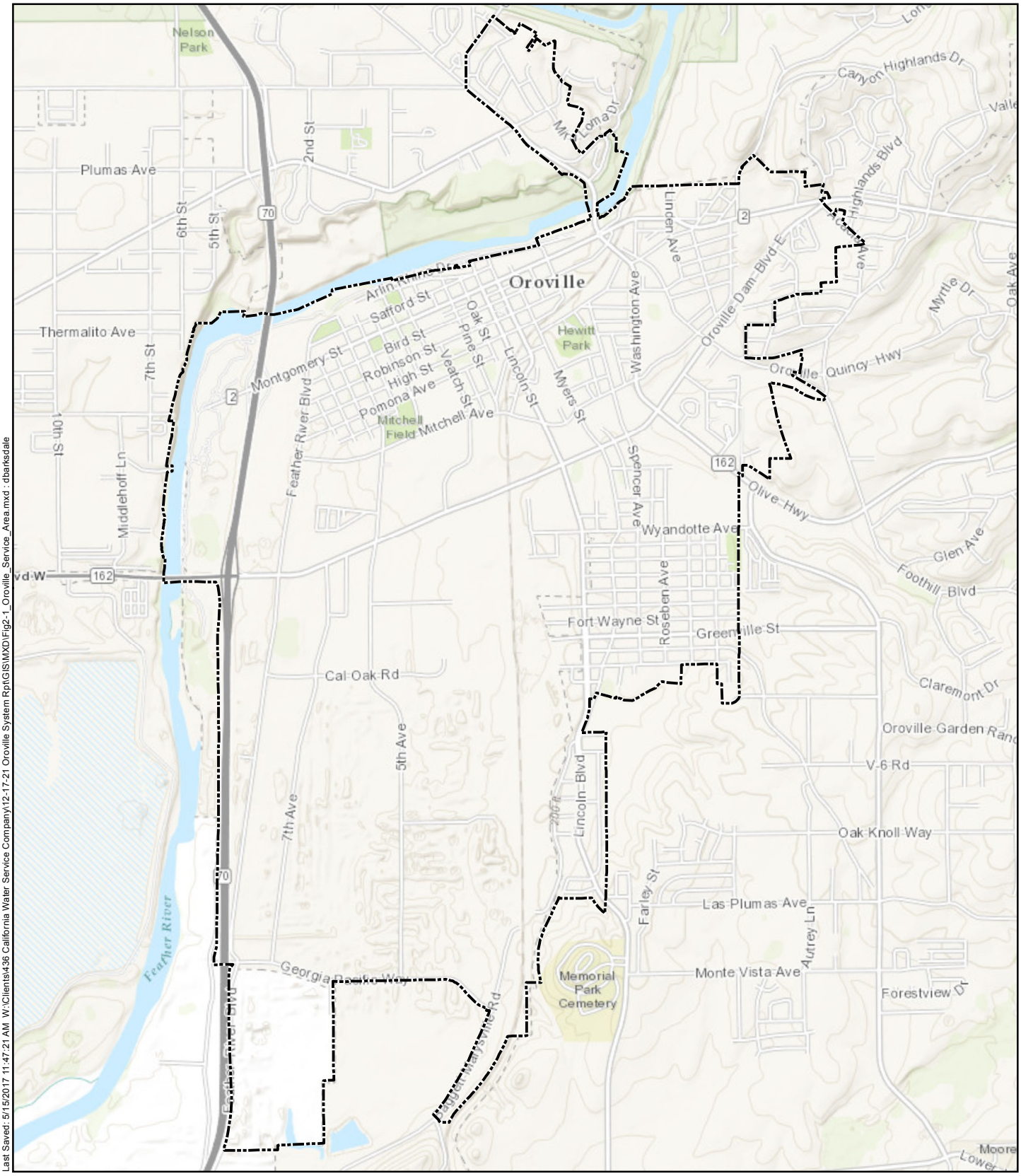
## 5.0 SUMMARY AND CONCLUSIONS

Cal Water has provided water service to the City of Oroville since 1927. As it is regulated by the CPUC, Cal Water must justify and document the need for capital improvements through the GRC process. Cal Water uses planning documents, along with improvement needs identified by Oroville District staff to develop capital projects for inclusion in the GRC. Projects included in the GRC are then given another level of scrutiny by the ORA, an independent state consumer advocate agency that advocates on behalf of Cal Water's customers.

The principal capital needs for the Oroville District system are related to renewal and replacement of facilities and pipelines. Over the last 10 plus years, Cal Water has developed a comprehensive program for evaluating its pipeline assets, which represents its largest capital investment in the Oroville District water system, as well as assessed replacement needs for other water system facilities, based on facilities condition and performance. These programs use historical information, along with risk information to prioritize capital projects.

Much like water systems across the country, Cal Water's system is aging. However, the system is well maintained. Cal Water has a preventative maintenance program to routinely inspect and operate facilities to maintain and repair them, as needed. Since completion of its residential metering program in 2013, Cal Water calculates non-revenue water, which includes apparent losses due to meter differences, data error and unauthorized consumption, and real losses due to leakage. Cal Water's non-revenue water, as a percentage of total system production, has ranged from 7.5 to 8.1 percent in the last three years, which is considered an acceptable level for water utilities.

The results of our evaluation of Cal Water's operation and maintenance of the Oroville District water system indicates that they are adequately prioritizing and replacing aging infrastructure, when required. Cal Water maintenance and assessment practices appear to be adequate for delivering a high-quality water supply to their Oroville customers. Finally, Cal Water's practice of prioritizing main replacements based on pipeline condition and performance is a sound practice, given the relatively small customer base in the Oroville District. This approach helps to control the cost of water service.




Last Saved: 5/15/2017 11:47:21 AM W:\Clients\436 California Water Service Company\12-17-21 Oroville System Rpt\GIS\MXD\Fig2-1_Oroville_Service_Area.mxd : dbarksdale

**Symbology**

Water Service Area Boundary

N

0 0.25 0.5

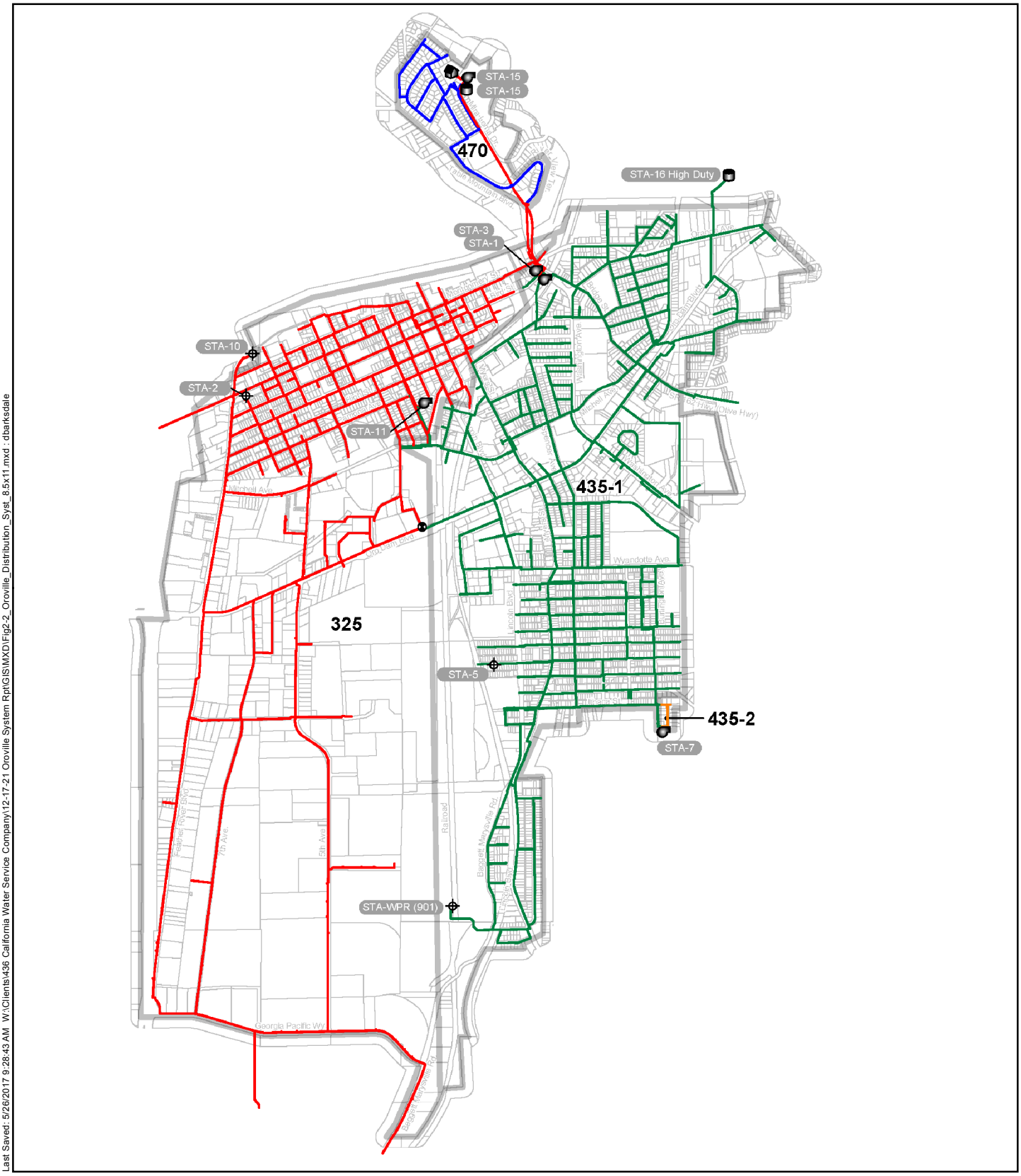
Miles

WEST YOST ASSOCIATES

**Figure 2-1**

**Oroville District Service Area Boundary**

California Water Service
Oroville System Review




Last Saved: 5/26/2017 9:28:43 AM W:\Clients\436 California Water Service Company\12-17-21 Oroville System Rpt\GIS\MXD\Fig2-2_Oroville_Distribution_Syst_8.5x11.mxd : dbarksdale

**Figure 2-2**

**Oroville District Distribution System**

California Water Service
Oroville System Review

WEST YOST ASSOCIATES

CALIFORNIA WATER SERVICE™